LG Industrial Systems

LG RMU II

- Contents
- Generally
- Technical Characteristics
- Design
- Operating Mechanism
- Manipulation and Control
- Interlocks
- Installation and Putting Into Service
- Additional Fittings
- Power Transformer Protection
- RMU for Outdoor
- Compact Substation
- Maintenance
- Type Designation and Dimensional Drawing

Index

ISO14001 ISO9001

TRI-PHASE

MEC RMU

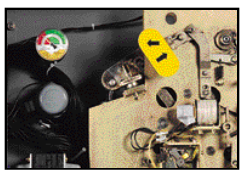
RING MAIN UNIT

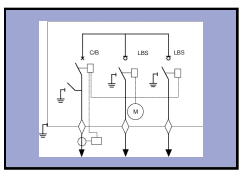
TYPE : RCS-(2L-1C/B)

LG Industrial Systems

LGIS's SF_6 Ring Main Unit

for system voltage up to 24kV,
are non-extensible
for cubicle systems





RMU

Contents Index

CONTENTS

1. GENERALLY 4
2. TECHNICAL CHARACTERISTICS AND MEASURING DRAWING 4
3. DESIGN 4
4. OPERATING MECHANISM 5
5. MANIPULATION AND CONTROL 5
6. INTERLOCKS 6
7. INSTALLATION AND PUTTING INTO SERVICE 6
8. ADDITIONAL FITTINGS 7
9. POWER TRANSFORMER PROTECTION 8
10. RMU FOR OUTDOOR 9
11. COMPACT SUBSTATION 10
12. MAINTENACE 10
13. TYPE DESIGNATION 10

Contents Index

1. GENERALLY

LGIS's Tri-MEC ring main unit is metal clad cubicle built for rated voltage up to 24kV. The main purpose of Tri-MEC ring main unit is energy distribution transformer substation up-to 1,000 kVA.

Basic version of Tri-MEC ring main unit consists of two incoming feeders with vacuum load break switches in incoming (ring main) feeders and one transformer feeder with vacuum circuit breaker.

- three-positional vacuum load break switches in incoming (ring main) feeders
- vacuum circuit-breaker with electronic over-current protective relay in transformer feeder.

Besides the obligatory manual drive, ring main unit series Tri-MEC can be equipped with motor drive and set of releases for remote control of each device. This enables full automation of distributive transformer stations, regarding various specific requirements.

Tri-MEC ring main unit is designed for indoor installation at normal service conditions, in accordance with IEC 60265-1, IEC 60056, IEC 60298, IEC 60694 and IEC 60129.

2. TECHNICAL CHARACTERISTICS

<Table 1>

Nominal data	Unit	Three-position load break switch	Circuit breaker
Rated frequency	Hz	50/60	50/60
Rated voltage	kV	24	24
Rated power frequency Withstand voltage 50Hz/1min	kV	60	60
Rated lighting impulse Withstand voltage	kV	125	125
Rated load breaking current	A	630	630
Rated breaking capacity	kA	-	16
Rated making capacity	kA	40	40
Rated short time current (1s)	kA	16	16

3. DESIGN

Single line diagram is visible at the front cover of the ring main unit.
Three positional load break switches are installed in parallel at the lower side of metal steel container (see Fig.1)

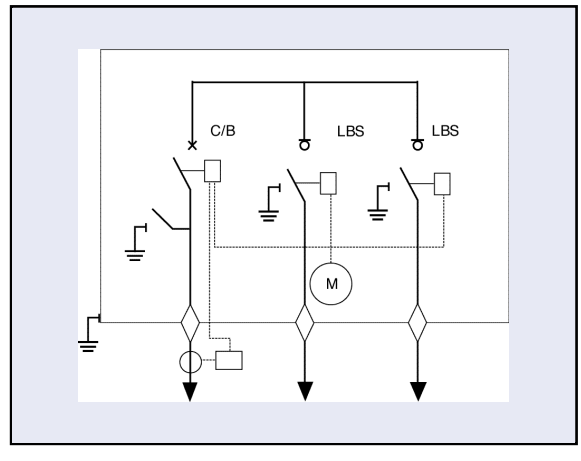


Fig.1 Internal structure & single line diagram of Tri-MEC ring main unit

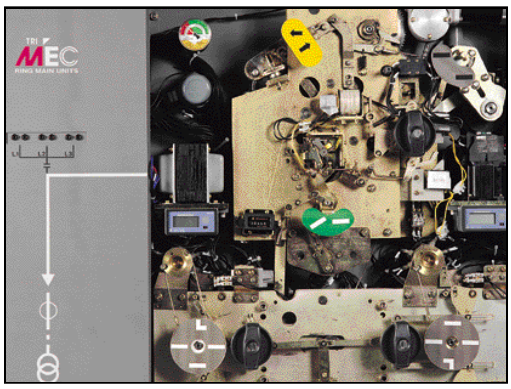
Contents Index

4. OPERATING MECHANISM

Operating mechanism (Fig.2) used for Tri-MEC ring main unit control, consits of two semi-assemblies installed in separate housings(between plates).

These two semi-assemblies are attached to the front side of steel container and connected to the main shafts of devices within the container.

The mutual kinematic interconnection between these two semiassemblies makes them work as a whole mechanism which controls all devices in Tri-MEC ring main unit.



(Fig 2)

5. MANIPULATION AND CONTROL

Manual charging of main spring is shown at(Fig.3-1) The handle should be turned clockwise.

Manipulations with vacuum circuit breaker are shown at (Fig.3-2)
Manipulations with load break switches are shown at (Fig.3-3)

Protective earthing blades (behind the circuit breaker) can be controlled only manually (Fig.3-4)
If the operating mechanism is equipped with electric motor drive and set of releases for remote control, each operation can be performed remotely.

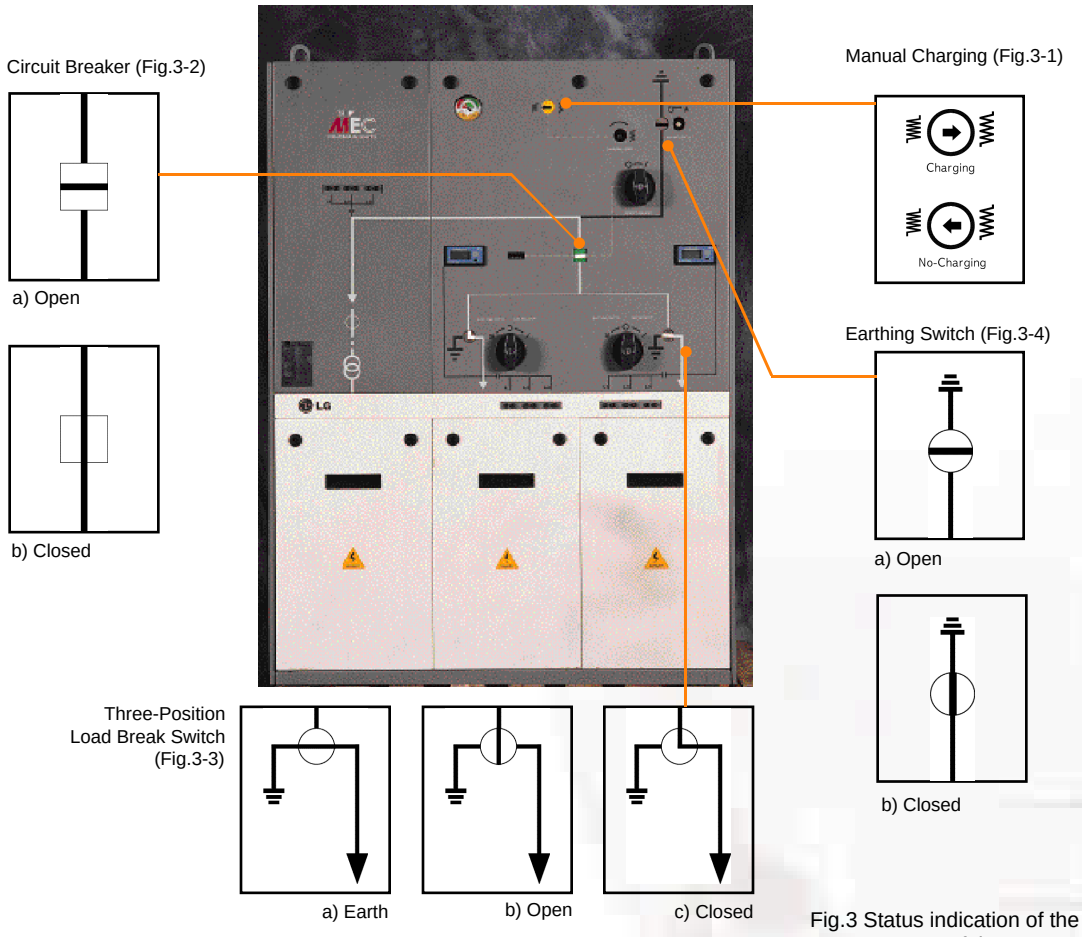
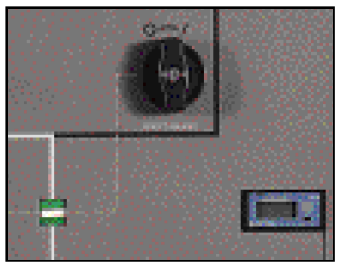


Fig.3 Status indication of the main contacts of the apparatus

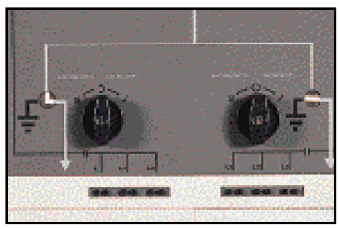
Contents Index

6. INTERLOCKS

Each apparatus built in Tri-MEC RMU and be locked in any chosen position. The locks and keys are parts of their operating handles (see Fig.4)



(Fig.4-1) C/B Mechanism S/W



(Fig.4-2) LBS Mechanism S/W

Fig.4 Locking and keys for manual operation interlocking

False order of the manipulations is prevented by design as well as mechanical interlocks:

- The circuit breaker can not be closed if the earthing blades have been in closed position and vice versa, earthing blades can not be closed of the main contacts of the circuit breaker are not open.
- If the earthing blades are not in earthing position, opening of the covers in front of transformer feeder cable compartment is not possible.
- Prevent of switching(when the cover is removed) can be performed with the locking (key for manual operating interlocking of C/B-see Fig.4-1)
- If the three-positing load break switch is not in earthing position, opening of the cover is not possible.
- Prevent of switching(when the covers are removed) can be performed with the locking (key for manual operating interlocking of LBS-see Fig.4-2)

7. ISNTALLATION AND PUTTING INTO SERVICE

7-1 Connection.

a) Primary circuits.

Bolted transformer feeder connectors are located at the left side of the cubicle under the separately protective cover also ring main feeder connectors are located at the lower side of the cubicle (Fig.5-1)

b) Control circuits.

The ring main unit without the left front cover is shown at the (Fig.5-2)
Terminals are located under the switchgear left front cover, in upper left corner.

If the multiple plug is not installed, control circuit wires should be led out through the opening at the top.

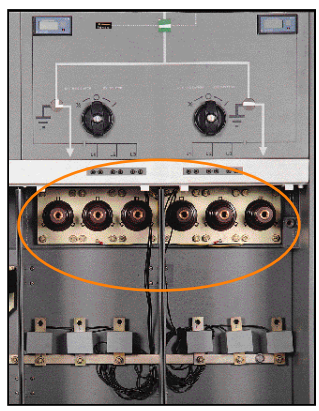


Fig.5-1
Bushing of incoming ring main feeder

Fig.5-2
Transformer feeder bushing and CT

7-2 No-voltage status check.

Capacitive voltage dividers are installed in each high voltage connection insulator (Fig.6)
No-voltage status check is simple and easy.
These indicators can be plugged in the sockets permanently or removed after no-voltage status check.
One voltage indicator is delivered with each distributive ring main unit.
On request, more indicators are available.

(Fig.6)

Contents Index

7-3 Phase comparator

Electronic phase comparison test unit (Fig.7) connected to the voltage indication sockets can be used to check if the voltage of various cable connections are in phase (green light) or in opposition (red light at the device).
Phase comparison test unit can be delivered on request.

(Fig.7)

7-4 Earth fault and Short circuit indicator

Ring Main feeders can optionally be fitted with three-pole short-circuit indicators. Each one has a red indicating element which shows when it has operated. Short-circuit indication can be installed in the form of commercially availabel equipment. It may be fitted with 1NO + 1NC auxiliary contact and it can be reset by hand or as an option, automatically.

7-5 Cable tests

Simple and easy access to the cables is provided by special insulation caps at each cable connector.
Cable test adapter is to be connected to the cable connector.

8. ADDITIONAL FITTINGS

<Table 2>

FITTING	OPERATIONAL VOLTAGE(*)	NOTE
Electric motor drive, for main spring charging.	24V , 48V , 110V , 220V	Consumption : 350W
Electromagnetic releases, for remote control of the circuit breaker.	24V=, 48V=, 110V , 220V	Consumption : 200W
Electromagnetic couplers, for remote control of the load break switches.	24V=, 48V=, 110V , 220V	Consumption : 250W
Auxiliary devices.		5NC + 5NO contacts
Multiple connector(plug)		6 or 24 pins
Capacitive voltage indicator.		Type : DSA2
Three-pole short circuit indicator.		Type : IKI-10

(*) In accordance with customer's choice.

Contents Index

9. POWER TRANSFORMER PROTECTION

9-1. Basic Information.

Vacuum circuit breaker can be tripped by protective release(8), connected to Buchholz relay and/or thermoprotector release(5).
Usual operational voltage of this release is 200V/50Hz.
Protective current transformers(3) provide overload and short-circuit protection of power transformer.

Another tripping coil "actuator"(9) receives tripping impulse from electronic relay (4) connected to current transformers.

LEGEND:

1. Vacuum circuit breaker (RMU-transformer feeder).
2. Power transformer.
3. Protective current transformers.
4. Electronic relay.
5. Thermoprotector.
6. Protection level choice switch.
7. Auxiliary contactor.
8. Protective release coil.
9. Trip coil-actuator(striker).

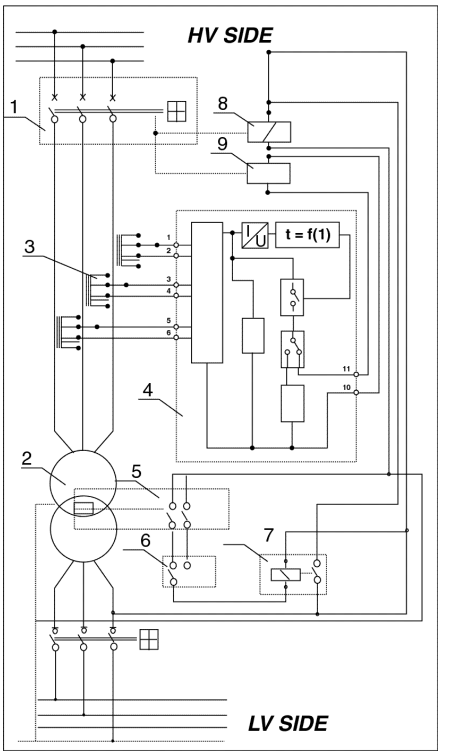


Fig.10 Transformer substation protection-circuit diagram

Rated primary currents of power transformers are listed in Table 3

<Table 3>

Output power of power transformer V(kVA)	Rated currents of power transformers (A)	
	Nominal voltage 12kV	Nominal voltage 24kV
200	11.5	-
250	14.4	-
315	18.2	-
400	23.1	11.5
500	28.9	14.4
630	36.4	18.2
800	46.2	23.1
100	57.7	28.9

Basic principle of overcurrent protection operation is to "mirror" the currents of power transformer(2) to electronic relay(4), using protective current transformers(3).
When the primary current increases for more than double value of nominal current, the relay(4) sends voltage impulse to the actuator(9).
Actuator triggers mechanical system which trips the circuit breaker.
Actuator(striker) operates with vary low energy electrical signal supplied by current transformer through relay(4).

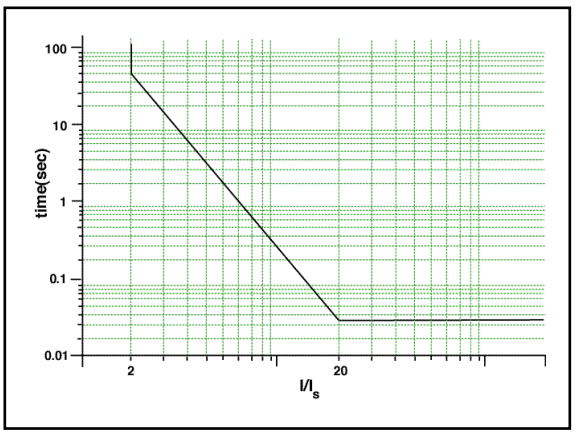


Fig.11 Tripping characteristic

Contents Index

9-2 Overcurrent Protection Setting.

Complete overcurrent protection system which covers most of power transformers is based on two types of current transformers (ST1 and ST2, see Table 4)
IN combination with various connection of relay and current transformer terminals all standard sixes of power transformers for rated voltages 12kV and 24kV have been covered.

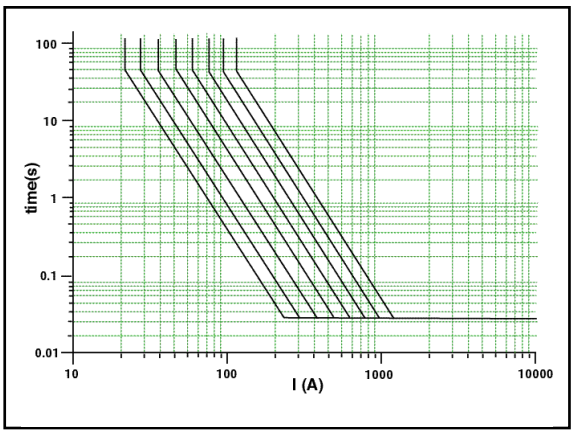


Fig.12 Tripping characteristics for various current

<Table 4>

Primary current(A)		11.5	14.4	18.2	23.1	28.9	36.4	46.2	57.7
Current transf.	ST1	■	■	■					
Current transf.	ST2				■	■	■	■	■
Connection Terminals	S1-S2	■	■	■					
	S1-S3				■	■	■	■	■
Relay-short Circuit bricks		1	2	3	1	2	3	4	5

9-3 Current Transformers installation and connection.

Each power cable must be set through the opening in the current transformer(see Fig.13)
Zero potential envelope (cable screen) must be burned back and pulled through the opening.

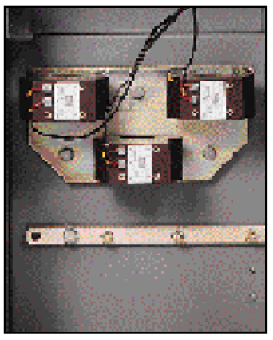


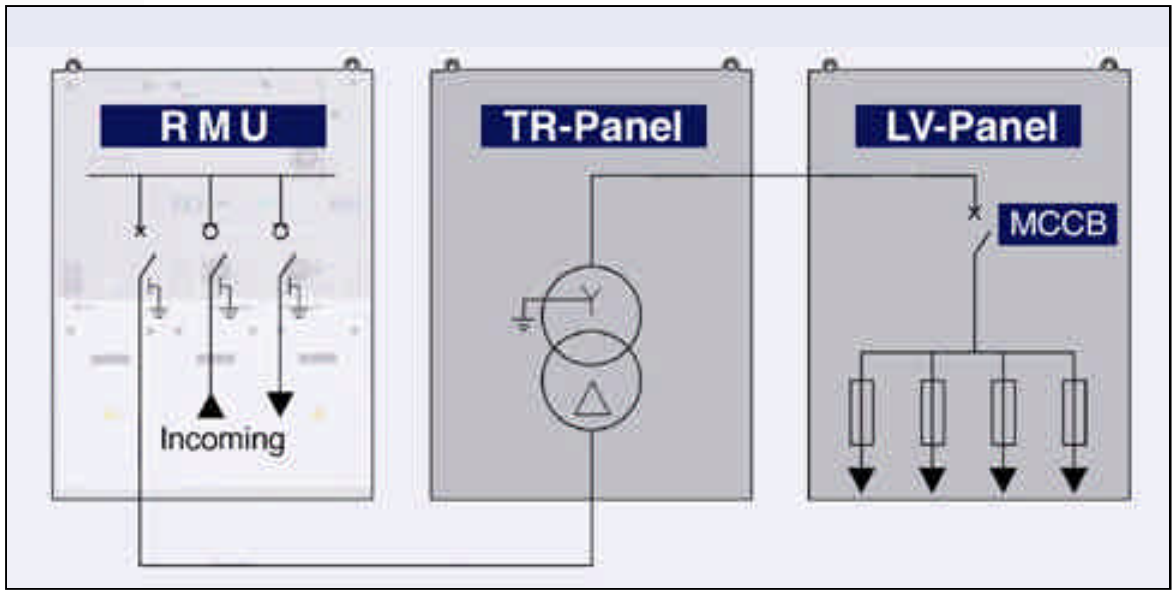
Fig.13 Current transformers-cable connection

10. RMU FOR OUTDOOR

Fig.14 Installation for outdoor

Contents Index

11. COMPACT SUBSTATION



12. MAINTENANCE

Maintenance of ring main unit covers only periodical monitoring in order to notice possible irregularities which could occur.

a) Pressure gauge (Fig.16-1)

a) Piston Pressure swhich (Fig.16-2)

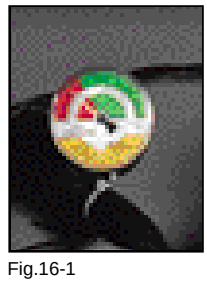


Fig.16-1

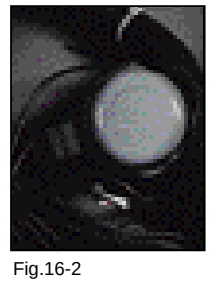


Fig.16-2

Fig.16
Pressure gauge and piston pressure switch for SF6 pressure control.

13. TYPE DESIGNATION AND DIMENSIONAL DRAWING

Type designation includes the main characteristics of Tri-MEC Ring Main Unit

<Table 4>

LGS	X	M	24	6	12	21	D
1	2	3	4	5	6	7	8

1 : LG Industrial Systems Ring Main Unit
2 : Tri-MEC Ring Main Unit
3 : Motor Driving Operate
4 : Rated Voltage (24:24kV)
5 : Rated Current(6:630A)
6 : Basic Impulse Voltage Level(12:125kV BIL)
7 : Switches (21:2 LBS & 1C/B)
8 : Connector Type(D:Dead Break)

Contents Index

Type Test Certificate

CESI TEST

GPS 96.018533

p. 1

STLA

type test certificate of	Many active load current switching tests, cable-charging current switching tests, line-charging current switching tests, short-circuit making tests, earth fault current test, cable-charging current test under earth fault conditions, short-time withstand and peak withstand current test, short-circuit making and breaking tests
apparatus	Metal-enclosed SF6 gas-insulated switchgear (RMU) fitted with: - three-pole vacuum general purpose switches with three-pole SF6 earthing switch (Way 1 and 2) - three-pole vacuum circuit-breaker with three-pole SF6 earthing switch
designation	LCG-M-24-S-12-3/1-D rated voltage 24kV; rated normal current 630A; rated frequency 50 Hz
manufacturer	LG Industrial Systems Co. Ltd - Chungcheong Bug-Do - KOREA
tested for	LG Industrial Systems Co. Ltd. - Chungcheong Bug-Do - KOREA
date(s) of tests	April 22 to 26, 1996

The apparatus, worked point in accordance with the descriptions, drawings and photographs enumerated in the reference documents, described on this certificate, has been submitted to the tests of proving tests of accordance with:

IEC 60056-1, 2nd edition (1987) sub-clause 6.1.4A & 6.101.10 ; IEC 60129, 1984 Sub-clause 6.5
IEC 60265 - 1987 Sub-clause 6.8, 6.102.1 to 6, 6.106.5, 6.106.8

The type test certificate has been issued by CESI in accordance with the EEC directives and operating principles and under the terms of the CTL agreement with the above mentioned manufacturer following exclusively the STL guides.

The results are shown on the record of proving tests and the oscillograms attached in the test reports. The values obtained and the powers guaranteed are considered to comply with the above mentioned requirements and to justify the ratings assigned by the manufacturer as listed on page no. 2.

The certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same characteristics with that tested rests with the manufacturer.

Any partial reproduction of this certificate, no comprehensive of the page accompanied by any pages on which are quoted the ordered ratings of the apparatus tested, are permitted without written permission from CESI.

no. of pages 5

issue date July 28, 1999

prepared TEST - A. GIOGLI

approved TEST - V. SCARIONI

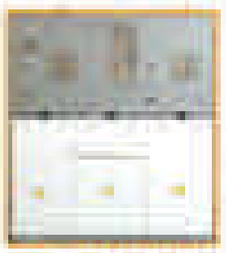
CESI
Centro Elettrotecnico Sperimentale Italiano Giacinto Motta spa

Via R. Rubattino, 54
20134 Milano - Italia
Telefono +39 02 21251
Fax +39 02 21255440
http://www.cesi.it

Società soggetta alla direzione e coordinamento di CESAM Srl
Capitale sociale interamente versato
Registro delle Imprese di Milano n. 43000
R.E.A. di Milano n. 94081

Società Certificata
Sistema Qualità Aziendale
R.T.I. ITA03/0980/QM
C.F. 00793580150

www.lgis.lg.co.kr



LG constantly endeavors to improve
our products so that information
in this catalog is subject to
change without notice

LG Industrial Systems

■ **HEAD OFFICE**

LG Mullae Building 10, Mullae-dong 6ga
Youngdungpo-gu, Seoul
150-096, Korea
Phone : (82-2) 2006-3219
Fax : (82-2) 2006-3912
http://www.lgis.lg.co.kr
E-mail : sjbaik@lgis.lg.co.kr

JAN 2000 Printed in Korea